

WATER QUALITY TALKING, TESTING, TRACKING



WOLFTEVER CREEK, HAMILTON COUNTY

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The background of the slide is a solid blue color. In the lower half, there are several decorative elements consisting of concentric white circles, resembling ripples on water. These ripples are arranged in a cluster at the bottom, with one smaller ripple on the right side and a larger, more complex set of ripples on the left and center.

SPRING CREEK



NORTH CHICKAMAUGA

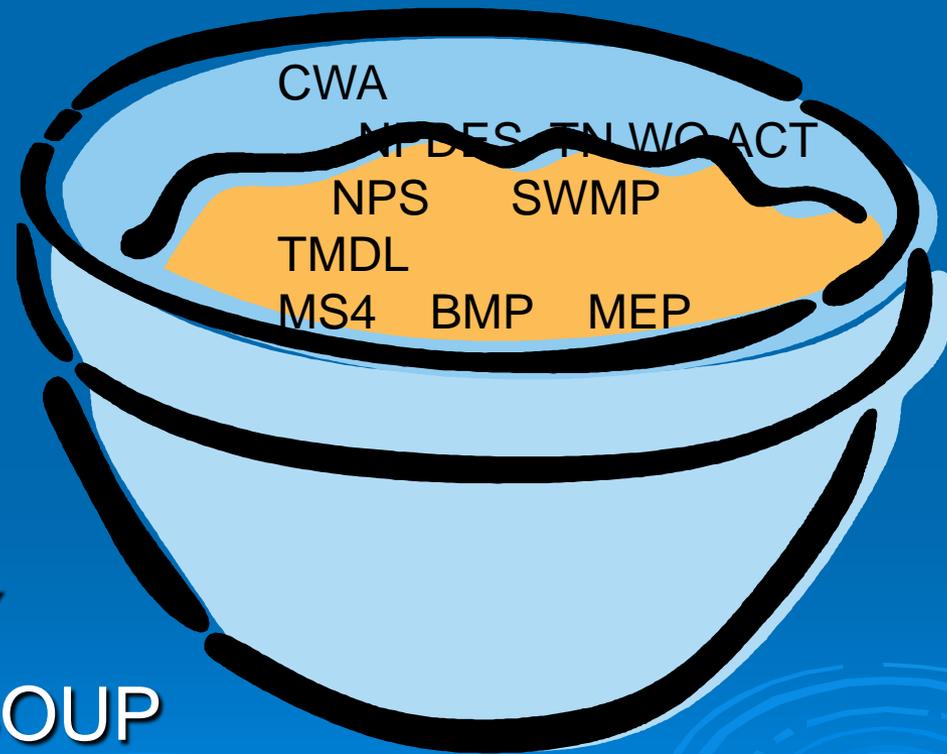


JOHNSON'S BRANCH



OVERVIEW

- BACKGROUND
CWA, etc.



- REGULATORY
ALPHABET SOUP

OVERVIEW

- NPDES –
PERMITTING
SYSTEM
- MONITORING –
PROTOCOLS
- SOME COMMON
POLLUTANTS
- STAKEHOLDER
CONCERNS



BACKGROUND

- Water pollution issues have been around since people started using water from the streams and rivers around them....a LONG time.
- As civilizations became more urbanized with greater population densities, the issues evolved over time and the risks from dense, industrialized populations became greater as streams, rivers and wetlands were filled, channelized, moved, drained, tapped for industry and drinking water, and used as waste receptacles.

BACKGROUND

- In the U.S., awareness of the importance of clean water did not begin with seriousness until the mid-late 19th century (River and Harbors Act of 1899)
- The growing problem of industrialized and human waste caused the Cayuhoga River (OH) to catch fire several times since the 1930's, the most spectacular fire occurring in 1969.

BACKGROUND

- The 1969 fire and other incidents increased concerns at the national level and led to the Clean Water Act in 1972.
- That legislation was the beginning of an era of recognition that water (and other natural resources) were being polluted with inadequate regulatory protection and the beginning of the passage of stringent regulations.

BACKGROUND

- In a nutshell, the CWA required:
 - discharge permits for any discharges to waters of the US
 - technology-based standards for municipal and industrial discharge sources
 - water quality standards (narrative or numeric requirements); monitoring
 - water quality inventory - Sec 305(b)/303(d)...list
 - enforcement protocols
 - standards for thermal pollutant discharges

BACKGROUND

- CWA was amended in 1987 and a Nonpoint Source Management System was created under Section 319 that provides grants related to water quality.
- Permit program (NPDES) first focused on Publicly Owned Treatment Works (POTW)(sanitary sewers)and industrial wastewater; the 1987 amendments expanded the permitting program to cover stormwater discharges. This expansion recognized that stormwater runoff had become a significant source of pollution.

303(d) Streams – Hamilton County

These streams are in the Lower Tennessee River Watershed Area:

Nickajack Reservoir (nutrients, E Coli, habitat loss) 1.1 miles

Spring Creek (E Coli) 9.6 miles

South Chick (P, Habitat Alteration, E Coli, Siltation) 17.6 miles

Nine Mile Branch (Low DO, Habitat alterations) 4.0 miles

303(d) continued

N. Chick (pH, habitat alterations) 8.02 miles

Wilkerson Branch (E coli) 5.8 miles

Wolftever Creek (E coli) 11.1 miles

This list does not include streams in the City of Chattanooga or Signal Mountain's MS4 jurisdiction.

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THE ALPHABET SOUP OF COMPLIANCE

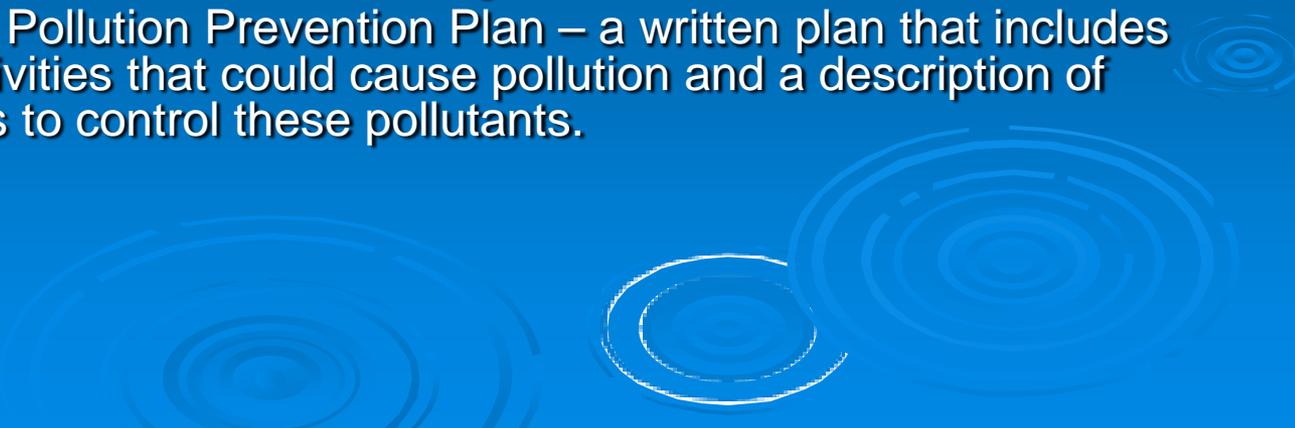
CWA – Clean Water Act of 1972 + Amendments

Tennessee WQ Act of 1987 – State legislation that enforces water quality standards

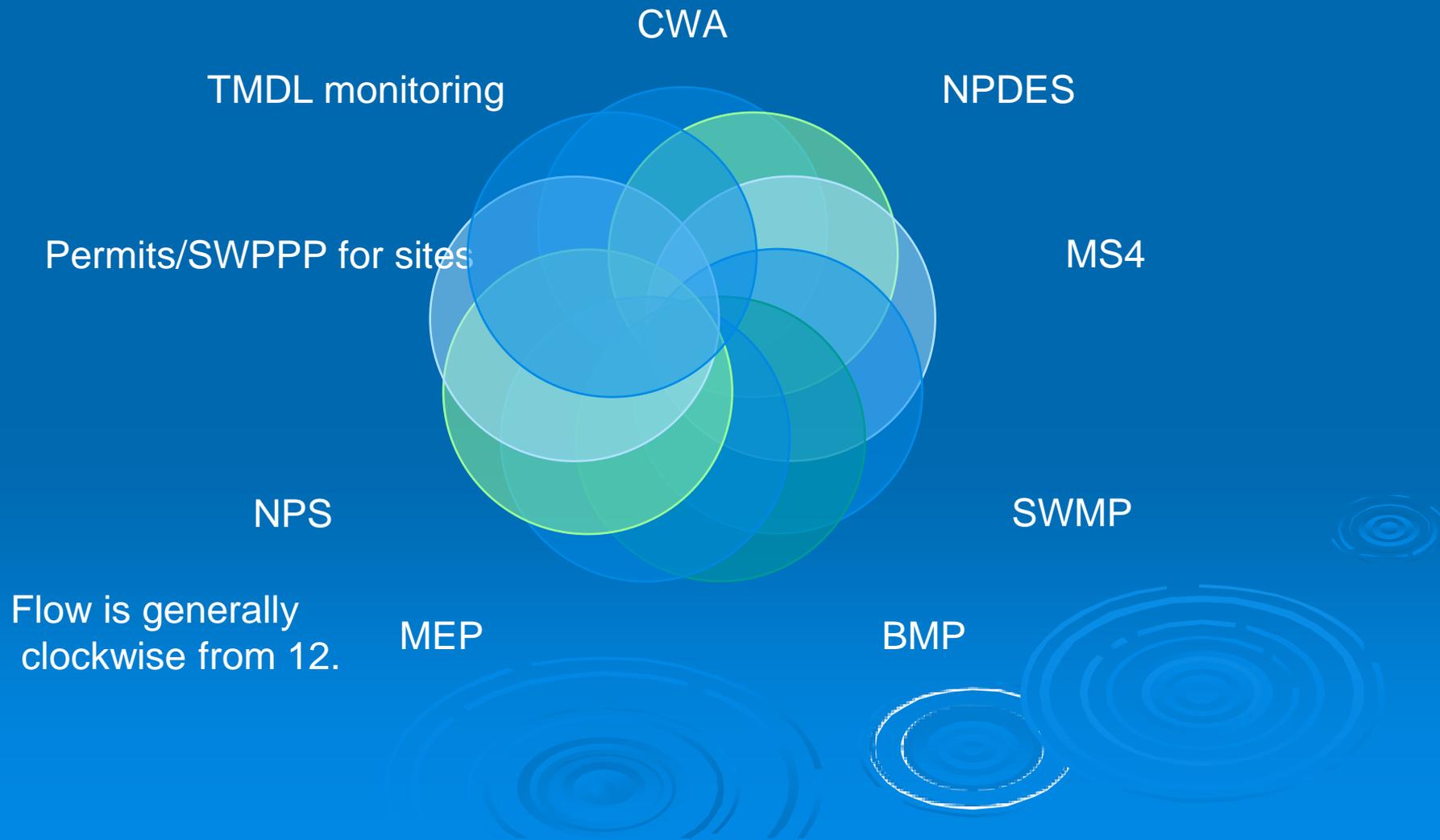
MS4- **M**unicipal **S**eparate **S**torm **S**ewer **S**ystem – a conveyance or system of conveyances owned or operated by a state, city, county, etc., designed for collecting/conveying stormwater, which is not a combined sewer, and which is not part of a POTW (e.g. Moc Bend plant)

NPDES – National Pollutant Discharge Elimination System – the system established under Section 402 of CWA that regulates discharges of pollutants into waters of the US.

ALPHABET SOUP

- NPS- Non-point Source Pollution –pollution from other than a single source...such as stormwater runoff from parking lots, roads, etc
- TMDL – Total Maximum Daily Load – a study that quantifies the amount of a pollutant that can be assimilated in a water body, identifies the sources of that pollutant, and recommends actions to achieve compliance with applicable water quality standards
- BMP – Best Management Practice – schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the state.
- MEP –Maximum Extent Practicable – technology-based discharge standard for MS4s to reduce pollutants in stormwater discharges (CWA Section 402)
- SWMP – Stormwater Management Plan – a written, comprehensive program to manage the quality of stormwater discharged from MS4s
- SWPPP – Stormwater Pollution Prevention Plan – a written plan that includes site maps, id of activities that could cause pollution and a description of measures/practices to control these pollutants.
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PUTTING THE ALPHABET SOUP IN ONE BOWL



NPDES Permitting

- MS4s (Hamilton County, Chattanooga, etc) operate under an NPDES permit issued by the Tennessee Department of Environment and Conservation's Division of Water Pollution Control.
- The permits may be general or individual, depending on the municipality.
- Permits are issued on 5-year cycles.

NPDES Permitting

NPDES permitting for municipalities was done in 2 phases:

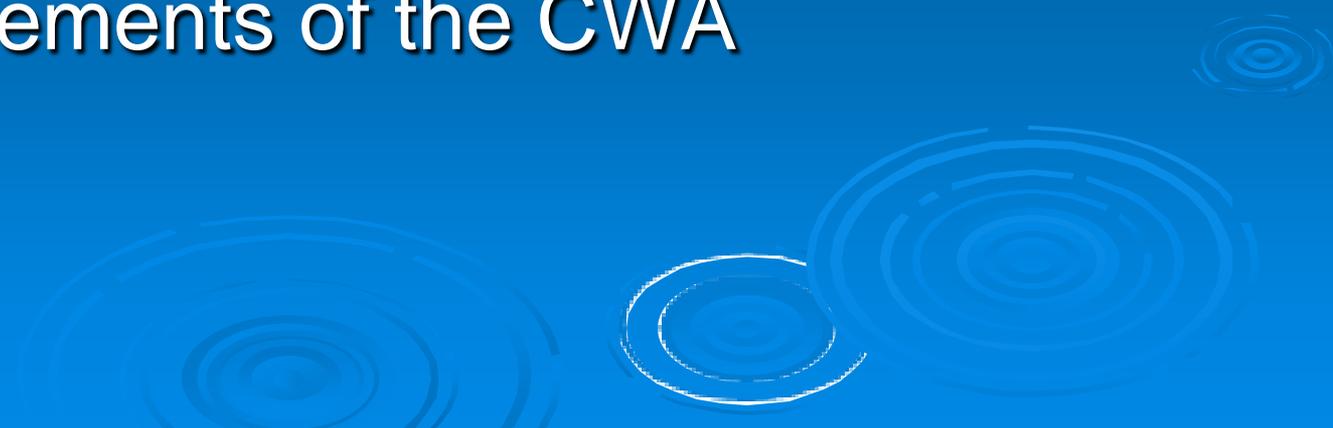
Phase I (1990) - large and medium MS4s with populations (100,000 or greater based on US Census data)

Phase II (2003) – small MS4s with populations/urbanized areas with populations of 10,000 or greater and density of 1,000 per square mile

The basic concept is that risk to water quality is greater in higher populations/larger urban areas.

NPDES Permitting – Small MS4

Basic Requirements:

- a. Reduce discharge of pollutants to the MEP;
 - b. Protect water quality;
 - c. Satisfy the appropriate water quality requirements of the CWA
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NPDES Permitting-Small MS4

- Phase II Permits (Hamilton County) have 6 minimum control measures:

Public Education and Outreach- to inform citizens

Public Involvement (meetings, etc) – to involve citizens

Illicit Discharge Detection and Elimination –to detect and eliminate discharges of anything other than stormwater

Construction Site Runoff Control – to implement and enforce control program for erosion and sediment

Permanent Stormwater Management in

New and Re-development –to address permanent controls for site runoff after development

Pollution Prevention/Good Housekeeping for

Municipal Operations – to meet the goal of preventing or reducing pollutant runoff from municipal operations such as maintenance areas, public works shops, parks & recreation sites, system cleaning, etc.

NPDES Permitting

Under the NPDES permit, municipalities may be co-permitted/share responsibility as in Hamilton County: Hamilton County Urbanized Area, Collegedale, East Ridge, Lakesite, Town of Lookout Mtn, Ridgeside, Red Bank, Soddy-Daisy are all members of the County Program.

Municipalities then enact Rules and Regulations, Ordinances, and Policies to enforce the permit provisions and establish standards for BMPs, utilizing MEPs, and measurable goals for achieving compliance.

HAMILTON COUNTY PROGRAM



MONITORING

- NPDES permits require MS4s to perform analytical monitoring in streams with TMDLs and in impaired streams [303(d)]
- Current permit for Hamilton County's Program requires:
 - Monitoring for TMDL of siltation
 - Monitoring for TMDL of habitat alteration
 - Monitoring for TMDL of pathogens

GENERAL REQUIREMENTS

1. Representative sampling – samples and measurements must be representative of the monitored activity
2. Test Procedures – Test procedures must follow approved procedures found in 40 CFR Sec 136.
3. Tennessee programs must follow the Quality System Standard Operating Procedures (QSSOP) established by the Division of Water Pollution Control.

Specific: Siltation & Habitat Alteration (“Bugs”)

Where discharges from the MS4 have been identified as the source of the impairment, biological stream sampling must be performed using the Semi-Quantitative Single Habitat (SQSH) Method found in the QSSOP for Macroinvertebrate Stream Survey (2006 version). One sample per stream segment must be collected, with all impaired segments being sampled within a 5-year period.

Specific: Pathogens

For stream segments identified as being impaired for pathogens, where discharges have been identified as a source of the impairment, bacteriological sampling must be performed using the QSSOP for Chemical and Bacteriological Sampling of Surface Water (December 2009). Sampling must meet the following:

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Pathogens, continued

1. Five samples and corresponding flow measurements within a 30-day period to establish a geometric mean;
2. Summer Months (June-September)
3. All pathogen-impaired segments must be sampled within a 5-year period.

Record-keeping

- Date, exact location by lat/long & time
- Names of individuals who conduct the sampling and measurements
- Dates of analyses at laboratory
- Names of individuals who performed the analyses
- Analytical techniques/methods listed on reports of results
- Reports of results kept on file (min 3 yrs)

Additional – Macroinvertebrates (Siltation and Habitat Alteration)

- Readings for the following:
 - Dissolved Oxygen (DO)
 - pH
 - Temperature
 - Conductivity
- Individual or multi-probe instruments
- Calibrate following manufacturer's directions (minimum daily) and keep calibration log with date, meter type, parameter, standard, reading, any adjustment, and comments. Signed by person performing.

Continued...

- Mid-stream readings prior to collecting the samples.
- Duplicate readings at each site.
- Record data.
- Perform drift check on each meter at end of day or end of trip for multiple sites. Note any calibration needed if greater than 0.2 for pH, DO, temp or greater than 10% for conductivity.

Macroinvertebrates, contd.....

- Select 1 to 4 habitat areas (riffles, runs or pool rocks, undercut banks, etc)
- Collect samples using a 500-micron mesh triangular net using kick or jab techniques (kick into net or thrust net into stream for a distance of 2 net widths (0.5 meter). Sample organisms from Orders *Ephemera*, *Plecoptera*, *Diptera*, *Coleoptera*, *Odonata*, *Tricoptera*, and listing in QSSOP.
- Composite 4 kicks/jabs in a 500-micron sieve and rinse remainder using water from the stream.
- Preserve specimens in small bottle with 80% ethanol.
- Take samples to office and check identity with dissecting scope.
- Using the QSSOP tables, calculate biometrics.

Pathogens...

- Measure DO, pH, temperature and conductivity at each site after samples are collected.
 - Duplicate readings.
 - Calibrate (same procedure as macroinvertebrate sampling)
 - Drift check.
 - Sample stream by grab sample (bucket, bailer, etc) and fill sample bottles.
 - Duplicate samples.
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Pathogens, etc.

- QA/QC: Trip blanks, Field blanks, and Duplicate samples at minimum of 10% of sample sites.
 - Blank water must be organic-free reagent grade water.
 - Wash hands and use powder-free gloves.
 - Utilize Chain of Custody and carefully document the chain.
 - Make arrangements with lab well ahead of sampling event to ensure meeting holding times.

Hamilton County TMDL Streams-Sample Sites

➤ Siltation & Habitat:

Ninemile Branch -0.1 mile upstream from confluence with Pitts Branch

North Chickamauga – Mile 12.3 (Boy Scout Road bridge)

South Chickamauga – Mile 15.8 at Audubon Acres

Stringers Branch – Mile 0.6 behind Austin Garden Center on Signal Mtn Road

Hamilton County TMDL Streams- Sample Sites

➤ Pathogens:

Stringers Branch – Mile 0.6 behind Austin
Garden Center on Signal Mtn Road

South Chickamauga – Mile 15.8 at
Audubon Acres

Spring Creek – Mile 0.7 at Spring Creek
Road Bridge

SOME COMMON POLLUTANTS - SOURCES

Failing septic systems & sanitary systems –
bacteria

Animal waste including domestic livestock –
bacteria

Natural erosion – sediment

Agricultural practices – sediment

Urban practices/construction – sediment

Unpaved roadways – rural areas,
incomplete subdivisions -sediment

COMMON POLLUTANTS/SOURCES

Pesticides, Herbicides, Fertilizers from overuse/improper use – source of organics, P compounds

Urban trash/debris – source of bacteria, suspended solids

Petroleum products from parking lots, streets – picked up in storm events

Metals – some from NPS sources; most industries are closely regulated

Other NPS – car washing in neighborhoods, etc.

STAKEHOLDER CONCERNS

- You are stakeholders in your watershed, at UTC, at your home, at your business.
- A major solution to water quality issues is stakeholder education and involvement.
- Therefore, PLEASE....

Know your watershed – its tribs, its primary streams, its land uses, its problems, its successes, its regulation

STAKEHOLDERS, continued

- Expect that elected leadership will become aware and involved in water quality issues.....contact officials at local, state, and national level and ask questions about pending legislation, pollution issues, and inform them about your concerns.
- Get involved with a watershed group and volunteer to do stream walks, simple monitoring, clean-ups, etc.
- If you are interested on a professional level, work as an intern where possible and gain field experience; complete the EPA online course (www.epa.gov).



STAKEHOLDERS,continued

- Contact your local water quality organization....visit them and ask questions...

www.hamiltontn.gov/WaterQuality

423-209-7851

QUESTIONS



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